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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,301	05/04/2006	Naoki Suehiro	062506	6800

38834 7590 09/03/2009

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EXAMINER	
SINGH, HIRDEPAL	
ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
09/03/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentmail@whda.com

Office Action Summary	Application No.	Applicant(s)	
	10/578,301	SUEHIRO, NAOKI	
	Examiner	Art Unit	
	HIRDEPAL SINGH	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6-8, 10 and 12* is/are rejected.

7)☒ Claim(s) *2-5,9 and 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the amendment filed on May 21, 2009. Claims 1-12 are pending and have been considered below.

Response to Arguments

2. In view of the drawing figure filed with the amendment dated May 21, 2009, the objection to the drawings is withdrawn.

3. The amendment corrected the informalities in the claims. Therefore, the objection to the claims is withdrawn.

4. The amendment corrected the issues in the claims. Therefore, the rejection under 35 USC 101 to claims 1-5 and 7-11 is withdrawn.

5. Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554) further in view of Hottinen et al. (US 2005/0185734).

Regarding claim 1:

AAPA discloses a communication method for transmitting a multipath characteristic measurement signal and a plurality of data transmission signals (as shown in figure 16),

wherein the multipath characteristic measurement signal and data transmission signals (An and Bn Cn in figure 16) are a signal array formed by a plurality of coefficient matrices that are orthogonal to one another (background art; page 2, lines 17-19) within the matrices and which comprise at least one coefficient array that is common in the column direction or row direction (page 2, lines 18-29; page 4, lines 13-20 and figure 16 describes coefficients of matrix formed with multipath measurement signal An and plurality of data transmission signals).

AAPA discloses all of the subject matter as described above except for specifically teaching that (1) the multipath characteristic measurement signal formed by the respective coefficient matrices is the same signal array formed by the one common coefficient array, and (2) the multipath and data transmission signal received in the device are arrays with matrices having row vectors.

However, regarding item (1) above, Kim in the same field of endeavor discloses a mobile communication system and method where the multipath signal information is gathered and a signal is generated corresponding to the transmission signal signature (abstract; paragraphs 0011 and 0013) and the multipath characteristic signal represents coefficients of the matrix that is used for transmitting the data and multipath signal (paragraphs 0012 and 0088).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Kim in AAPA for forming multipath characteristic measurement signal with same coefficient array that is common in order to get a desired performance from the system with the phase and amplitude information of the signal is estimated and the delay associated with the transmission signal is compensated with desired performance.

However, regarding item (2) above, Hottinen in the same field of endeavor discloses a system and method for digital signal transmission where the multipath and data transmission signal received in the device are arrays with matrices having row vectors (figures 4 and 5; paragraphs 0026 and 0314).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA for forming multipath characteristic measurement signal with the transmission signal having signal arrays with row vectors in matrices representing the signals in the communication system for optimal diversity with ratio of the maximum power to the average power or the ratio of the average power to the minimum power is minimized.

8. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554) further in view of Hottinen et al. (US 2005/0185734) as applied to claim 1 above, and further in view of Hottinen et al. (US 2005/0078761).

Regarding claim 6:

AAPA discloses all of the subject matter as described above except for specifically teaching that an arbitrary user arbitrarily has a matched filter that corresponds with a coefficient array that is used in the formation of a transmission data array and receives an arbitrary data transmission signal via the matched filter.

However, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where an arbitrary user arbitrarily has a matched filter that corresponds with a coefficient array that is used in the formation of a transmission data array and receives an arbitrary data transmission signal via the matched filter (paragraph 0038).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

Regarding claim 12:

AAPA discloses all of the subject matter as described above and further discloses a transmission signal data structure formed by the method of forming a transmission signal (column 2, lines 18-28).

9. Claims 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Kim et al. (US 2002/0181554) further in view of Hottinen et al. (US 2005/0078761).

Regarding claim 7:

AAPA discloses method of forming a transmission signal, comprising the steps of:

forming a matrix (as shown in figure 16) of an arbitrary length by selecting orthogonal square matrices (background art; page 2, lines 17-19), the common row vector or column vector and an arbitrary number of row vectors or column vectors that are orthogonal (An Bn and Cn in figure 16) to the common row vector or column vector;

forming a multipath characteristic measurement signal (page 2, lines 18-29) array by multiplying each of the coefficient arrays of the common row vector or column vector by a multipath characteristic measurement signal (page 4, lines 13-20 and figure 16 describes coefficients of matrix formed with multipath measurement signal An and plurality of data transmission signals);

forming a data transmission signal array (page 2, lines 23-25, the signal array is formed) by multiplying each of the coefficient arrays of the other row vector or column vector in the matrix by each of the plurality of data transmission signals; and

rendering the multipath characteristic measurement signal array and data transmission signal array a transmission signal (page 3, lines 1-9).

AAPA discloses all of the subject matter as described above except for specifically teaching that, (1) forming a matrix from plurality of matrices for the transmission signal; and (2) the matrix formed by orthogonal square matrices comprises a common row or column vector.

However, regarding item (1) above, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where for the

transmission signal (figure 1), a matrix is formed by plural matrices transformed from code matrices to get the transmission matrix (paragraphs 0016-0017 and 0035-0037).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

However, regarding item (2) above, Kim in the same field of endeavor discloses a mobile communication system and method where the multipath signal information is gathered and a signal is generated corresponding to the transmission signal signature (abstract; paragraphs 0011 and 0013) and the multipath characteristic signal represents coefficients of the matrix that is used for transmitting the data and multipath signal (paragraphs 0012 and 0088).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Kim in AAPA for forming multipath characteristic measurement signal with same coefficient array that is common in order to get a desired performance from the system with the phase and amplitude information of the signal is estimated and the delay associated with the transmission signal is compensated with desired performance.

Regarding claim 8:

AAPA discloses all of the subject matter as described above except for specifically teaching that the orthogonal square matrix is a Hadamard matrix or a unitary matrix.

However, Hottinen in the same field of endeavor discloses a high rate transmission diversity communication system where orthogonal square matrix is a Hadamard matrix (paragraph 0025).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to use teachings of Hottinen in AAPA to form a matrix from plural matrices in the transmission signal in order to improve symbol rate with the diversity in the system without limiting the performance and data rates.

Regarding claim 10:

AAPA discloses all of the subject matter as described above and further discloses the number of row vectors or column vectors used in the formation of the data transmission signal array is established on the basis of the received multipath characteristic measurement signals (page 3, lines 1-9).

Allowable Subject Matter

10. Claims 2-5, 9 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record discloses a system and method for multi path measurement, but prior art fails to disclose that in the system where a multipath characteristic measurement signal array is formed by using one row vector or column vector coefficient array with respect to the multipath characteristic measurement signal,

also by forming a data transmission signal array by using a row vector coefficient array that is orthogonal to the row vector or a column vector coefficient array that is orthogonal to the column vector with respect to the plurality of data transmission signals, the transmitted multipath characteristic measurement signal and plurality of data transmission signals are uncorrelated.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIRDEPAL SINGH whose telephone number is (571)

270-1688. The examiner can normally be reached on Mon-Fri (Alternate Friday Off) 8:30AM-6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. S./
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611